FOOT-AND-MOUTH DISEASE.

APPOINTMENT OF A COMMITTEE OF INVESTIGATION.

THE recurrence of this disease in England during the present year has been a source of grave concern to all engaged in agricultural and live-stock industries. It is, however, a matter for congratulation to the Board of Agriculture, and its veterinary department in particular, that the disease has been stamped out again with such a comparatively small loss. There have been eighteen outbreaks this year, with 467 animals affected, an approximate average of 26 animals in each outbreak. This is truly remarkable considering that foot-and-mouth disease is probably the most rapidly contagious of all epizootics.

During the four years immediately preceding the present year, there were five outbreaks with 127 animals affected, each outbreak being suppressed in little more than a week, at a total cost of a few thousand pounds. This has only been possible as the result of early diagnosis and the immediate slaughter of all affected and contact animals. The importance of drastic and immediate action can be well realised by noting some of the latest Continental returns. In Germany during August alone there were 37,737 outbreaks of foot-and-mouth disease; in July 12,385 were recorded in Holland, 4,097 in Belgium, and 16,027 in France, where it has been estimated that the loss will amount to more than fifteen millions sterling.

The new Minister for Agriculture has therefore taken a very wise step in appointing a committee, as announced in Parliament last week, "to inquire into the circumstances of the recent outbreaks of foot-and-mouth disease and to consider whether any further measures can be adopted to prevent their recurrence." The committee of twelve is to be presided over by Sir Ailwyn Fellowes, and includes the members of Parliament for South Wilts, St. Patrick's Division of Dublin, Barkston Ash, Carmarthen West, Newmarket, and North Bucks, together with Major E. M. Dunne, Mr. R. Carr, Mr. E. E. Morrison, Mr. E. P. Nunneley, and a member of the Central Chamber of Agriculture. They are to be assisted by the veterinary and administrative officers of the Board.

Of greater importance, however, is the proposal to appoint an expert scientific committee to proceed to India, where the disease is unfortunately very rife, to investigate the special characteristics of the disease, its etiology, the means by which it is contracted and spread, and practicable means of prevention. It is to be hoped that tangible results will be attained, so that we can continue to enjoy the markets of the world for our live-stock, as the result of the freedom of these islands from such animal scourges.

DR. W. SUTHERLAND.

IT is with regret that we have observed the report of the sudden death, on October 4, of Dr. William Sutherland, at his residence, Stawell Street, Melbourne, as recorded in *The Melbourne Age*. Dr. Sutherland was born in Scotland in 1859. At the age of ten he went with his parents to live in Melbourne. He obtained a Government exhibition, and finished his preliminary education at Wesley College. From there he went to the University, where he took his Master of Arts degree, obtaining the highest honours each year in mathematics. The winning of the Gilchrist scholarship in his final year enabled him, under the terms of the exhibition, to go to London University College. He was then only twenty years of age. Three years later he returned to Australia, having obtained a degree in science.

From that time until his death Dr. Sutherland devoted himself entirely to original scientific research. He contributed papers to scientific periodicals in America, England, and on the Continent. His first line of thought led him to inquire into the molecular constitution of matter in its various phases of liquids and solids. Later he devoted attention to the subject of viscosity. His papers, which appeared mainly in *The Philosophical Magazine*, are well known to the scientific world. They are distinguished by great width of reading in the latest phases of the subjects he treated, combined with very bold speculation always brought into ample comparison with experimental knowledge. His greatest success was the discovery, in 1893, of the relation connecting the viscosity of a gas with the temperature; the result of a very ingenious, though not quite demonstrative, theoretical argument, and amply confirmed by all subsequent work. His writings were copious in all problems connected with molecular physics, whether they concerned laws of attraction between molecules, the nature of emulsion in its physiological ramifications, the application of electrons and of electrochemical ideas to the properties of matter, the molecular structure of water, or many other subjects. His generalisations were, indeed, so numerous that it was often a difficult task to try to estimate their value. Although Dr. Sutherland had thus contributed a large number of papers to various scientific journals, he never published anything in book form. He preferred to devote his energies entirely to original work and research. For a period he discharged the duties of professor of physics at the Melbourne University during a temporary absence of the occupant of the chair; but in the main he preferred freedom and control of his time. His relations with the University staff were cordial and intimate. He was an examiner at the University and at the College of Pharmacy, and was also connected with the scientific work of the School of Mines.

J. L.

NOTES.

WE are informed that Dr. Glazebrook, the director of the National Physical Laboratory, who has been seriously ill since the end of September with enteric fever, is now making satisfactory progress. After so long an attack of fever his recovery must necessarily be somewhat slow, and it may yet be some little time before he can be regarded as convalescent; but there is good reason to hope that the recent marked improvement may be maintained.

THE case of the *Hawke* and *Olympic* collision, which is now before the Admiralty Courts, is directing considerable attention to the influence of passing vessels upon each other, particularly when those vessels are travelling in the same direction at speeds not differing greatly from each other. Experiments are now being made at the William Froude Tank of the National Physical Laboratory, with models of the *Hawke* and *Olympic*, to test whether such an influence was present and acting at the time of the collision. The president of the Admiralty Court and the various counsel paid a visit to the experiment tank on Saturday last and witnessed a large number of experiments with the models. These were of wax, and were towed from the carriage, or bridge, which spans the large waterway of the tank. The general theory of the influence of passing ships upon each other is the outcome of the "stream-line" theory of the late Prof. Rankine; and we hope to give a fuller account of this shortly.

AN earthquake of unusual strength was felt on November 16 at about 9.25 p.m. (Greenwich mean time) in the south of Germany, throughout Switzerland, and in

the east of France and the north of Italy. It was followed by two others of less importance early on November 17, one shortly after midnight, the other at about 3 a.m. The reports so far available in this country are singularly meagre. There does not seem to have been any loss of life, but slight damage to property occurred in several places, such as Constance, Stuttgart, Freiburg, Mülhausen, and Hechingen, and, though it is difficult to credit the statement, at Munich. Leaving the last-named place out of account, the area of slight damage is about 140 miles long from east-north-east to west-south-west, and 90 miles wide, and contains about 10,000 square miles. The centre may have been about 10 miles to the north of Schaffhausen. The shock was felt so far as Dresden, 310 miles from this point, so that the disturbed area may have contained as much as 300,000 square miles. It is thus probable that the focus was situated at some depth. The vibrations were recorded at several distant observatories—in this country at Shide and West Bromwich. At Heidelberg, Besançon, and Potsdam the recording levers were deranged or broken.

A DISCOVERY of remarkable prehistoric burials has been made by the Broadstairs Archæological Society in the grounds of a private school. During excavations a series of Saxon graves came to light. Under these, and therefore of an earlier date, were found a number of graves arranged round a circular trench, in which the bodies had been buried with the arms and legs flexed. Nothing was found to give a clue to the date of these circular burials; but Mr. F. G. Parsons, who is making an examination of the bones, is of opinion that they belong to the Bronze age. Whatever the antiquity may prove to be, the find is one of importance, for we know very little of the inhabitants of Kent prior to the Saxon period. The remains, which are somewhat fragmentary, are to be placed in the museum of the Royal College of Surgeons, where they may be compared with other finds of a similar nature which have been made in the south-east of England. In the current number of the Journal of the Royal Anthropological Institute (vol. xli., p. 101) Mr. Parsons gives an interesting description of Saxon remains found in a cemetery near Folkestone.

FURTHER details of the Wright gliding experiments are now to hand. On Tuesday, October 24, the best flights were made in the teeth of a wind which was recorded by a gauge raised 12 feet from the ground to be blowing at 50 miles an hour. Orville Wright made nineteen successive glides, one, the last, enduring for 9m. 45s., and extending over a distance of nearly a quarter of a mile. During his seventeenth glide he remained stationary in the air for 5m. 11s., the whole glide lasting 7m. 15s. The following day twenty glides were made by Orville Wright and Alexander Ogilvie, but as the wind was slight nothing remarkable was achieved. On October 26 twenty-four flights were made, one of which lasted 2m. 15s. This was the last day before breaking up the camp. The new automatic stability device, which had arrived, was not fitted to the machine, and its trials were postponed to a later date. To the description of the machine used, given in NATURE of November 9, the following details may be added:—As the cutting-down of the skids necessitated the removal of the "blinkers," a vertical surface or keel-plane was fitted to the front edge of the main planes immediately to the right of the pilot, the object being to keep the glider directly head on to the wind. Furthermore, a boom projecting in front of the main planes some five feet carried a bag of sand, as the pilot's weight was insufficient to keep the machine level in high winds.

PROF. W. H. PERKIN, F.R.S., and Prof. E. Rutherford, F.R.S., have been elected corresponding members of the Munich Academy of Sciences.

THE Institute of Chemistry announces that Mr. Bertram Blount will deliver the second lecture on "Cement" at King's College, Strand, W.C., on Friday, December 1.

PROF. ANDREW MCWILLIAM, professor of metallurgy in the University of Sheffield, has been appointed by the Government of India to the newly created post of metallurgical and analytical inspector of steel in India.

WE learn from the *Revue scientifique* that the German Society of Aërial Navigation has constructed at Feldberg, in the Schiefergebirge, a geographical observing station for the study of aërial currents, and for the issue of a service of wind warnings.

THE council of the Royal Meteorological Society has awarded the Symons gold medal to Prof. Cleveland Abbe, of the United States Weather Bureau, in recognition of the valuable work which he has done in connection with meteorological science. The medal will be presented at the annual meeting of the society on January 17, 1912.

WE learn from *Science* that Mr. Waldemar Lindgren, who has been connected with the U.S. Geological Survey since 1884, and since 1907 has been in charge of the investigations of metalliferous deposits and of metal statistics, has been elected chief geologist, in succession to Dr. C. Willard Hayes.

THE Société Française de Physique has arranged a series of nine lectures on "Modern Ideas on the Constitution of Matter," by Madame Curie, Profs. Langevin, Perrin, Weiss, and other distinguished physicists. They are to be delivered on Saturday evenings during the next four months either at the Sorbonne or at the rooms of the society, and are open to all members of the society. The example set by the French society might with advantage be followed by some of our societies.

AT a meeting of the executive committee of the British Science Guild, held on November 15, it was announced that arrangements were being made to hold occasional evening meetings of the members, at which papers or lectures would be read, to be followed by discussions. Also further papers have been received on the subject of the conservation of the natural sources of energy, and it is hoped to publish this report before the close of the year. The subjects of coordination of charitable effort and postal reform were also discussed.

ON previous occasions we have referred to the mining operations made this year by the Duke of Sutherland to determine if the gold deposits in the Kildonan district of Sutherland could be worked at a profit. In our issue of September 28 (vol. lxxxvii., p. 425) we announced that information received from the field showed the experiments had been a financial failure. The report of Mr. William Heath, the expert entrusted with the operations, has now been commented upon in the Press. Mr. Heath says:—"This field cannot be worked by any method so as to realise on the most liberal estimate anything like half the working expenses."

THE president of the Royal College of Surgeons, Sir H. Butlin, delivered at the college two lectures (November 13 and 15) on "The Parasite of Cancer." Sir H. Butlin maintains that the cancer cell is a new creation, an independent organism most closely resembling a protozoon,

which lives as a parasite in the body of the animal which is suffering from cancer. He apparently does not suggest that it is a parasite derived from without, but that the host by some inscrutable means has fashioned it out of its own tissues.

THE death is announced, in *The Times*, of Dr. W. W. Webb, at Exeter, in his fifty-fourth year. Dr. Webb resided for some years at Netley, and was appointed curator of the Natural History Museum at the Royal Victoria Hospital, being awarded the Martin memorial gold medal and the Sir Joseph Fayrer's prize for pathology at Netley in 1883. He was the author of a guide for intending candidates for commissions and for junior officers of the Indian Medical Service, a manual of vaccination, and a work on the currencies of the Hindu States of Rajputana.

MR. JOSEPH COLLINSON, writing from the Animal Friend Society, asks for protection for the badger, as this sadly persecuted animal has dwindled down almost to extinction. Many well-known landowners have made praiseworthy efforts to protect the badger, and warmly advocate his preservation. "The protection of the badger," remarks Sir Harry Johnston, "ought to be made universal in the law of the land, quite as much as in the case of interesting wild birds," a sentiment which will receive the approbation of all who are interested in preserving the wild fauna of their native country. No other animal has made such a wonderful struggle for existence; and it is hoped by Mr. Collinson that protests may be made in time to prevent his total extermination.

THE second International Congress of Entomology will be held at Oxford on August 5–10, 1912, under the presidency of Prof. E. B. Poulton, F.R.S. Further particulars will be announced shortly. The executive committee proposes to find for members of the congress lodgings in the town, or rooms in one or more of the colleges at a moderate charge; rooms in college will be available only for men. The executive committee invites an early provisional notice of intention to join the congress, in order to be able to make the arrangements for the necessary accommodation. The proceedings of the first congress are in the press and will be published shortly. All communications and inquiries should be addressed to the General Secretary of the Executive Committee, Dr. Malcolm Burr, c/o the Entomological Society of London, 11 Chandos Street, Cavendish Square, London, W.

IT was suggested at a meeting of the Anglo-German Friendship Society, held at the Mansion House on November 2, under the presidency of the late Lord Mayor, that an Anglo-German Exhibition should be held in London in 1913. We learn from *The Times* that the idea has been favourably received, and an influential committee has been formed to forward it, under the presidency of the present Lord Mayor, consisting of the Lord Chancellor, the Duke of Argyll, Lord Brassey, Lord Avebury, Lord Weardale, Lord Courtney of Penwith, Lord Shuttleworth, Sir Frank Lascelles, Sir West Ridgeway, Sir Vezey Strong, Sir William Mather, Sir Ernest Tritton, Mr. Harry Lawson, M.P., and Mr. Alfred de Rothschild, with Mr. Cyril Rhodes, the honorary secretary of the Anglo-German Friendship Society, as honorary secretary.

THE London meeting of the Institute of Metals will be opened at the Institution of Mechanical Engineers on Tuesday, January 16, when the president-designate, Prof. W. Gowland, F.R.S., will deliver his inaugural address on the subject of "Copper and its Alloys in Early Times." The whole of Wednesday, January 17, will, if necessary, be devoted to the reading and discussion of a number of papers, amongst which may be mentioned the following:—Properties of certain copper alloys at high temperatures, G. D. Bengough; further experiments on the inversion at 470° C. in copper-zinc alloys, Prof. H. C. H. Carpenter; the influence of oxygen on copper containing arsenic or antimony, R. H. Greaves; the nomenclature of alloys, Dr. W. Rosenhain; poisoned brass, and its behaviour when heated in vacuo, Prof. T. Turner; and a paper by Dr. Carl Benedicks, of the University of Stockholm, dealing with some novel experiments on a zinc-antimony alloy.

WE regret to record the death of Mr. Eugene William Oates, at Edgbaston, on November 16, at sixty-six years of age. Like many other Indian officials, Mr. Oates, who served (chiefly, we believe, in Burma) for thirty-two years in the Public Works Department of India, devoted his leisure time to the study of the ornithology of the country in which he was long resident. His earliest ornithological work appears to be a "List of the Birds of Pegu," published in Calcutta in 1881, and a couple of years later appeared his "Handbook to the Birds of British Burmah, &c.," published in London, in two volumes. This was followed, in 1898–9, by a "Manual of the Game Birds of India," which likewise formed two volumes, and was published at Bombay. Somewhere about this time he appears to have retired from the service of the Indian Government, for in 1889–90 his name appears as editor of the second edition of Mr. A. O. Hume's "Nests and Eggs of Indian Birds," published, in three volumes, in London. His knowledge of Indian ornithology led Dr. Blanford to select Mr. Oates to write the first two volumes on birds in the "Fauna of British India," which appeared respectively in 1889 and 1890; and later he was engaged by the trustees to compile the "Catalogue of Birds' Eggs in the British Museum," the first volume of which was issued in 1888 under his own name, while in the other three this appears in conjunction with that of Captain Savile Reid. Mr. Oates's knowledge of Indo-Burmese ornithology was very extensive, and his work careful and elaborate.

THE committee of the British Antarctic Expedition has made an earnest public appeal for further contributions towards the support of Captain Scott's expedition in Antarctica. Through ill-fortune, unforeseen expenses have been incurred. On her voyage south after leaving New Zealand on November 29, 1910, the *Terra Nova* experienced terrible weather, and the damage done to the ship has entailed a heavy bill for repairs; and the cost of new stores to replace those lost on this voyage has to be met. After defraying these unexpected disbursements the money left will be hardly enough to enable the committee to pay until the end of March, 1912, the allowances of the wives and relatives of the officers and men of Captain Scott's party. On these accounts alone the committee must somehow raise more money. In addition, however, it is imperative that there should be no delay in securing further funds if the honour of first reaching the South Pole is to be secured for Captain Scott. The *Terra Nova* on her journeys unexpectedly came across the Norwegian expedition under Captain Amundsen, who also is trying to reach the Pole. The committee asks for 15,000*l.* by December 1, so that a telegram may be sent before the *Terra Nova* sails south to reassure Captain Scott that the necessary funds will be forthcoming. We agree with the committee that it would be pitiful if Captain Scott and his party were allowed to fail for want of financial support. We are confident that the appeal to the patriotism of our men of

wealth will not be in vain, and that the honour of this country in the world of science and exploration will be maintained by the generosity of the wealthy men at home and the efforts of the men of action now in south polar regions. Contributions should be sent to the treasurer, Sir Edgar Speyer, at 7 Lothbury, London, E.C.

THE advantage of the application of physiological knowledge to the problems of Egyptian archæology is shown in a clever explanation of the origin of the representation of an ancient standard found on the slate palette of King Narmer, which was discovered at Hierakonpolis, in Upper Egypt. It appears again in a specimen of the twelfth dynasty unearthed by Prof. Flinders Petrie below the palace of Apries, at Memphis. Dr. C. G. Seligmann and Miss M. A. Murray, in the November number of *Man*, point out that this curious figure represents the placenta, which is still, according to Mr. J. Roscoe, held in reverence by the Baganda, as it is supposed to contain the external soul of the chief, and is hence preserved at his birth. It was carried in procession by a special official, because the safety of the reigning sovereign was believed to depend upon its being carefully preserved.

IN the first part of the Journal of the Royal Anthropological Institute for the current year, Prof. A. Keith examines a collection of skulls, principally those of Negroes from the Congo Free State and Nigeria. These constitute four groups: those from Nigeria, the Congo, the Korawp, on the frontier of the German Cameroons, and a group of tribes including the Ekoi and Kabila of Nigeria, and the Fortit and Bongo of the Nile region. From the present distribution of the Negro tribes in equatorial Africa, Prof. Keith comes to the following conclusions:—There has been free intermigration; in the course of their evolution, the tendency of one tribe has been towards the accentuation of one set of characters, of another towards another set. Thus the Dinka acquire high stature and narrow heads; the typical Nigerians low stature and narrow heads; the Basoko wide, short heads and low stature; the Buruns wide heads and high stature. Interbreeding may have played its part; but if it had played a great part we should have found greater physical uniformity than there is. The influence of Arab blood on these tribes has probably been exaggerated.

THE Bulletin of the Johns Hopkins Hospital for September (xxii., No. 247) contains articles on Zabdiel Boylston, inoculator, and the epidemic of smallpox in Boston in 1721, by Dr. Fitz; medical notes on the "Divine Comedy" of Dante Alighieri, by Dr. Dernehl; and on "Molière and the Physician," by Dr. Kahn. A new department has been created in the Johns Hopkins University, to be known under the general title "Art as Applied to Medicine." Its purpose is to bridge over the gap existing between art and medicine, and to train a new generation of artists to illustrate medical journals and books. The instruction given is designed for the needs of two classes: (1) for medical students, and (2) for artists. The department is in charge of Prof. Max Brödel, and a synopsis of the two courses is given.

A REPORT by Dr. F. J. H. Coutts, on an inquiry as to condensed milks, has been issued by the Local Government Board. It contains much important matter on the history, methods of manufacture, composition, and use of condensed milk, with suggestions as to administrative control, labelling, &c. Condensed milk occurs as full-cream or machine-skimmed, and may be sweetened, partially sweetened, or unsweetened. The composition of the different brands varies somewhat; *e.g.* in the full-cream and fully sweetened the fat varies from about 9·0 to 13·7 per cent., and the sucrose (generally beet sugar) from 37·2 to 41·5 per cent. The condensed milks, except occasionally in the unsweetened brands, which are sterilised, generally contain some micro-organisms (up to several thousand per cubic centimetre), but they show no disposition to multiply either in the unopened or in the opened tins, as a rule. Diluted condensed milk, however, becomes a favourable medium for the growth of bacteria. The process of condensation appears to be fatal to the tubercle bacillus. The importance of condensed milks is in connection with infant feeding. The skimmed condensed milks are to be absolutely condemned for this purpose, owing to the small fat content. Infants fed on condensed milks seem to suffer from more infantile ailments, and the mortality is higher among them, than among those fed on cow's milk. As regards cost, the condensed milks are slightly more expensive than equivalent amounts of cow's milk and sugar. The labelling of some of the brands is very misleading to the poorer and illiterate mothers who principally use them. It is suggested that the skimmed brands should be labelled as unfit for infant feeding, and that some declaration of the content of fat and of substances foreign to milk should be obligatory on the labels.

A SIGNED portrait, accompanied by a memoir, of the late Mr. G. H. Verrall, the distinguished authority on British flies, forms the chief feature in the November number of *The Entomologist's Monthly Magazine*.

IN referring to his bird-marking experiments in the November number of *British Birds*, Mr. Witherby remarks that "the number of birds marked has steadily increased until this year the splendid total of just 9500 has been reached. In the first year of the inquiry only 2200 rings were used, but in the next year 7900 were placed, so that the number of birds 'ringed' by the readers of *British Birds* now amounts to nearly twenty thousand." The large increase in the number of rings implies, of course, increased expenditure, to meet which additional contributions are solicited.

IN its report for the year ending June 15, 1911, the Northumberland Sea-fisheries Committee gives a summary of the results of the experiments in marking fish and crustaceans which have been carried on locally during the last few years, together with tables and charts. The experiments in breeding lobsters show that an abundant supply of absolutely pure sea-water is essential to success; and it is interesting to note that during the year one of the officials had the opportunity of observing a lobster during the process of shell-changing. Experiments on Holy Island show that a vast area is available for the culture of mussels, to be used either as bait or food; and observations are also recorded on the spawning of cod.

TO *Naturwissenschaftliche Wochenschrift* for October 29 Dr. A. Kobelt contributes a long article on the physiological origin of markings and colour in the animal kingdom. Attention is directed to the prevalence of pigment in the neighbourhood of the great sensory and nervous structures, as exemplified by the dorsal stripe of many mammals and some lizards, the dark lateral line of fishes, the frequency of dark markings on the muzzle, and especially the concentration of colour in the eye and its neighbourhood. The hue of the ground-colour of animals is attributed by the author to the existence of an equilibrium between the effects of light-stimulus and the influence of the sense-organs, which leads to an equality in, and a large

increase of, the sensory cells. Disturbance of this equality gives rise to colour-markings. Apparently Dr. Kobelt does not believe in protective coloration.

THE Purdue University Experiment Station has taken a leaf out of the business man's book, and freely advertises its results among farmers. The Bulletins, a number of which are to hand, are written in a manner likely to attract, and demonstrate that the yield of maize can be considerably increased on the ordinary farm without a great expenditure, but solely by the adoption of improved varieties or better fertilisers. New crops have been introduced, and improved and more economical rations have been drawn up for dairy stock.

WE have received from the United States Department of Agriculture, Bureau of Entomology, catalogue by E. R. Sasscer of recently discovered Coccidæ and by D. Moulton of the North American Thysanoptera, and also an annotated bibliography of the Mexican cotton-boll weevil by F. C. Bishopp. Publications of this type are extremely valuable in enabling investigators to find their way through the appalling number of entomological publications that are put out at a rate probably unequalled in any other subject.

The National Geographic Magazine for September is largely devoted to two studies of Troglodytes, one by Mr. F. E. Johnson describing those of southern Tunisia, the second by Miss E. H. Brewer the cave-dwellers in Cappadocia. Some French officers divide the Tunisian Troglodytes, whose presence in that region is noted by the historian Sallust into three groups: those living in excavations in the ground, those occupying caves or holes in the hillside, and those living in houses superimposed one upon the other, the higher chambers being reached by precarious staircases or stones projecting from the walls. The Troglodytes in the Uskub Valley in Asia Minor occupy holes excavated in curious rock cones. Prof. Sterrett, of Cornell University, who has studied them, believes that this form of dwelling dates so far back as the Hittite period. Both these accounts of two remarkable races are illustrated by a series of admirable photographs.

IN the *Zeitschrift der Gesellschaft für Erdkunde* (No. 7) Dr. A. Rühl discusses the part played by isostasy in the formation of peneplains. He considers that when an elevated land mass is subjected to long-continued erosion the isostatic equilibrium is destroyed, and as a result, after a greater or less period of time, a new upward movement will take place, but to a less extent than originally. Local conditions will determine at what stage these isostatic movements will occur. The development of the earth's surface would not be a continuous operation, but rather one strongly periodic in character in which short periods of active orogenetic and epeirogenetic movement would be succeeded by relatively long periods of erosion. Orogenetic movements occurring would cause fracturing of the earth's crust, and eroding agencies would become active, removing material and redepositing elsewhere. This will destroy the isostasy, and sooner or later a warping or tilting of the whole land mass will occur.

PART iii., vol. xli., of the Records of the Geological Survey of India contains the usual annual statistics of the mineral production of India, the year here dealt with being 1910. Upon the whole, the production is just about stationary, the value of the output showing an increase only of some 12,000*l.*, whilst its total is 7,700,000*l.* The principal item, as before, is coal; the total output is just over 12 millions of tons, showing an increase of about 177,000 tons over 1909; on the other hand, prices have fallen again to about what they were before the boom of 1907–8, and may be looked upon as at about a normal level. The industry is evidently in a sound condition; the output per miner shows a satisfactory increase, and exports have gone up and imports have gone down by 43 and 36 per cent. respectively. Owing to the above-noted fall in price, the value of the coal output in 1910 is 324,321*l.* lower than in 1909; but, as explained, this is a healthy symptom so far as the coal industry is concerned. The next most valuable output on the list is that of gold, which is practically stationary at 2,200,000*l.* These two minerals are by far the most important amongst Indian mineral products, accounting for about three-fifths of the total value. The production of manganese ore shows a fair increase, the total for 1910 being just over 800,000 tons; prices were also rather better than they were in the previous year, so much so that whilst the quantity produced was increased by 20 per cent., its value was increased by no less than 40 per cent. The production of both mica and petroleum has fallen off during the year under review. Upon the whole, it may be said that whilst not chronicling any brilliant results, the statistics before us show a steady progress in the mining industry of our Indian Empire.

THE excessive rains of Saturday and Sunday last have occasioned considerable and extensive floods at many places in the south and east of England, and in Kent and Sussex a great deal of land is under water. The Weather Report issued by the Meteorological Office for the week ending November 18 shows that the total rainfall for the period was largely in excess of the average over the entire kingdom. The heaviest falls occurred in Scotland and Ireland, where in parts the rainfall for the week was about three times the average amount. Falls of more than an inch in twenty-four hours occurred in all parts of the kingdom; and at Worthing the measurement for the three days ending November 18 was 3·27 inches. The autumn rainfall for the eleven weeks commencing with September is now in excess of the average in all districts except in the north and west of Scotland, the north-east of England, and the Midland counties. The greatest excess for the autumn is 3·00 inches in the Channel Islands, which is followed by 2·85 inches in the south of Ireland and 2·73 inches in the south-east of England. The greatest deficiency of rain since the commencement of the year is 6·56 inches in the Midland counties, where the aggregate fall, so far, is only 16·53 inches. The temperature last week was largely in excess of the average in all the English districts, the excess amounting to nearly 5° in the east of England. The duration of bright sunshine was generally deficient.

THE meteorological chart of the North Atlantic for November issued by the Deutsche Seewarte gives an interesting account of a hurricane experienced on July 12 in the South Atlantic, near lat. 30° and long. 30°, by four out of five sailing vessels which left Chilian ports between May 17 and June 14, the tracks of which are laid down for the whole voyage to the English Channel. It is noteworthy that the storm occurred with a relatively high barometer; the synoptic charts drawn for July 10–13 show that a shallow depression lay over the coast of central Brazil on July 10, and that on the following day it had divided into two parts, the centre of one being on the coast in 20° S. and the other in about 26° S., long. 39° W. From the chart of July 12 it appears that the two systems had coalesced, and had travelled in a south-easterly direction. The atmospheric conditions are considered to be very striking (notwithstanding that it was the southern winter),

the more so as the disturbance proceeded from the somewhat low latitude of 20° S.

THE marine turbine speed-reducing gear fitted by the Westinghouse Company, of Pittsburg, to the United States collier *Neptune* is described in *The Engineer* for November 17. This is a modified form of the Melville-Macalpine gear with double-helical pinion and spur wheel. The power transmitted is 4000; the pinion keyed to the turbine shaft runs at 1250 revolutions per minute, and the screw shaft at 130—a reduction of nearly 10 to 1. The pinion shaft is not carried in rigid bearings, but is borne in a long sleeve, which is provided with three hydraulic pistons above and three below. The movement from the central position is trifling—two or three thousandths of an inch—but the liquid correction gives the gear a certain amount of elasticity, reduces shock and noise, and conduces to the sweet running of the gear. The *Neptune* has given great satisfaction on its trials.

WITH the view of ascertaining the resistance of reinforced concrete strong-rooms to attack by oxy-acetylene blow-pipes, tests were recently made on a slab prepared by the Indented Bar and Concrete Engineering Company, of Westminster. The results are described in *The Engineer* for November 17. The oxy-acetylene blow-pipe was applied to the slab for twenty-four minutes, at the end of which period, after much raking out of the resulting glass formed by the fusion of the sand, and accompanied by a deafening roar from the blow-pipe, a hole 3·5 inches in diameter was made through the slab. Whenever a steel bar was met the metal-cutter, *i.e.* a stream of pure oxygen directed on to the white-hot steel, was brought into action, and the steel instantly fused away. The concrete was the material which gave the trouble, the metal-cutter being powerless to act upon it. The same thickness of steel of any grade could not have resisted the metal-cutter longer than about four minutes. The test slab was 6 inches thick; 0·55 cubic foot of oxygen and 0·45 cubic foot of acetylene were consumed in the test, which clearly is strongly in favour of reinforced concrete as contrasted with steel.

A COPY of the Year Book for 1911 of the Indian Guild of Science and Technology has been received. The object of the guild is to cooperate in promoting the knowledge and application of pure and technological science in India with a view to the improvement of the methods of economic production and the amelioration of the sanitary condition of the people. Prof. Smithells, F.R.S., is the general president of the guild; and among the list of patrons we notice the names of Sir Henry Roscoe, F.R.S., Sir William Ramsay, K.C.B., F.R.S., and Prof. O. N. Witt. The year book runs to 135 pages, and contains an official report of the annual general meeting, held on December 19, 1910, of the activities of the various sections, and the speeches at the annual dinner. In addition, a number of scientific articles, many of them concerned with pressing Indian problems, are included. Altogether the guild, which is only in the third year of its existence, has entered upon a career of great usefulness.

MESSRS. NEWTON AND CO., 3 Fleet Street, E.C., have just issued a supplementary list of lantern-slides, in which several sets of slides of scientific interest are included. Among these subjects are remarkable examples of achievements of photography, pictures taken by Prof. R. W. Wood with ultra-violet and infra-red rays, photographs of snow crystals taken by Mr. W. A. Bentley, wild flowers, glaciers, and other scenes in Switzerland, and architectural hygiene.

OUR ASTRONOMICAL COLUMN.

THE SPECTRUM OF BROOKS'S COMET, 1911*c*.—With the three-prism slit spectrograph (No. iii.) and a small objective-prism spectrograph of 10 cm. focal length, both attached to the Pulkowa 30-inch refractor, Prof. Belopolsky secured several photographs of the spectrum of Brooks's comet during October. Eight hours' exposure with the slit spectrograph on October 4, 5, and 6 showed the bands 473 $\mu\mu$ and 431 $\mu\mu$ clearly, and others faintly; in each case the several maxima in each band were measured, and the wave-lengths are given to six figures. Measures of the radial velocity of the comet gave +15 km., agreeing with the ephemeris.

With the smaller spectroscope monochromatic images of the comet were found at 560, 516, 473, 405, and 388 $\mu\mu$, each image being sharply defined on the red side; special measures gave the values 388·36 $\mu\mu$ and 387·52 $\mu\mu$. Bands in the continuous spectrum extended from 420 to 421 $\mu\mu$ and from 402 to 405 $\mu\mu$. On October 1 the bands were equal in intensity, but on October 10 that at λ 388 was the brightest; this band only gave a faint trace of the tail (*Astronomische Nachrichten*, No. 4535).

THE CHEMICAL UNITY OF THE COSMOS.—In the current number of *Scientia* Prof. Fowler has an interesting article in which he sums up the evidence showing the chemical unity which exists among all the bodies of the visible universe, so far as our present means permit us to examine them. Kant and Laplace suggested such a unity; but it was not until Kirchhoff and Bunsen, in 1859, supplied the key which opened up to us celestial spectrum analysis that the suggestion could be practically tested. Several factors still interfere in many cases with the proof of absolute coincidence of wave-length in comparing radiations in different spectra, but Prof. Fowler believes that all celestial spectra will sooner or later come within the scope of laboratory reproduction. Most of the strong lines in the solar spectrum are already origined, and the sun has been shown to take its place in an orderly sequence of stellar forms. Then, again, the study of the various elements, under varying laboratory conditions, initiated by Sir Norman Lockyer, has provided us, so far as the main variations in celestial spectra are concerned, with terrestrial parallels for the stellar departures from the sun's spectral features.

SUN-SPOTS AND FLOCCULI IN 1910.—In addition to the values for December, 1910, No. 12, vol. i., of the *Boletin Mensuel del Observatorio del Ebro* contains the *résumé* of the solar and meteorological observations made during 1910. The spot areas were low throughout the year, and no spots were recorded at all in August, September, and December. The reduced area for spots, in both hemispheres for the whole year, was 165 millionths of the solar hemisphere, and for flocculi the analogous value was 401 hundred-thousandths, the ratio between the two being 24·3. Taking the hemispheres separately, the values for the northern was 42, and for the southern 123, millionths for spots, and 114 and 287 hundred-thousandths for flocculi. The mean heliographic latitude of spots was 10·1, and for flocculi 10·2. During the year there were 301 groups of flocculi occurring with spots and 525 occurring without, and the tabulated summary shows that those groups occurring with spots were decidedly of a more compact character than those occurring without.

ASTROGRAPHIC CATALOGUE, PERTH (W.A.) SECTION.—In the preparation of the International Astrographic Catalogue the section dec. −31° to −41° was allotted to the Perth Observatory, West Australia, which has just published the first volume of results. The complete measures will occupy thirty-six volumes; and the present issue, the first to be completed, is vol. iv. The method of work is briefly explained by Mr. Cooke, but a general introduction will appear later. It is believed that the faintest stars shown on the centre of the Perth plates are of about mag. 11·5, those at the extreme corners 10·5; and the present volume contains the measures of the rectangular coordinates and magnitudes of 13,636 star images between R.A. 18h. to 24h. on plates with centres in declination −32°.